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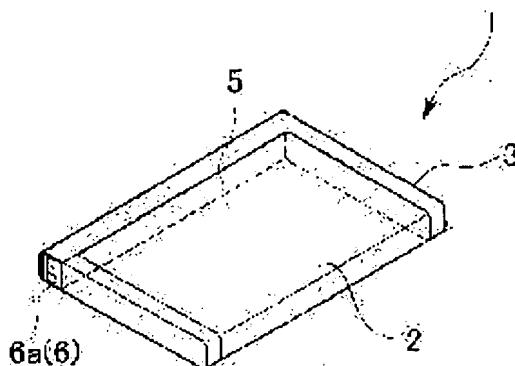
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(54) BATTERY, MANUFACTURING METHOD OF BATTERY AND PORTABLE TERMINAL

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a battery, a manufacturing method of the battery and a portable terminal provided with the battery, capable of enhancing and being manufactured in a compact size.

SOLUTION: A battery cell 4 and a connector 6 and a circuit board 5, electrically connected to respective terminals of this battery cell 4, are arranged. It is characterized with the battery cell 4, the connector 6 and the circuit board 5 being integrally molded by a resin mold part 3.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the personal digital assistant especially equipped with the manufacture approach of a dc-battery suitable as an object for cellular phones etc., and a dc-battery, and this dc-battery about the personal digital assistant equipped with the manufacture approach of a dc-battery and a dc-battery, and this dc-battery.

[0002]

[Description of the Prior Art] Conventionally, there is a thing equipped with a battery cell, the circuit board for charge control of a dc-battery and electrical protection, and the connector linked to the body of a personal digital assistant in the dc-battery used for personal digital assistants, such as a portable telephone and PHS (personal handy phone). Said connector is connected to the harness which said circuit board was respectively connected to the positive-electrode terminal and negative-electrode terminal of a battery cell through the connection terminal, and was connected to this circuit board. And in attaching this dc-battery in a personal digital assistant, the lid of the case of a personal digital assistant is opened, a dc-battery is set to dc-battery hold circles, and he connects with the connector by the side of the case in which said connector was formed by the dc-battery hold circles of a personal digital assistant, and is trying to close a lid (for example, refer to JP,2000-315483,A).

[0003]

[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional technique, in order to have to store it between a dc-battery and the dc-battery hold section as a harness is folded up when closing a lid after setting a dc-battery to the dc-battery hold section, there is a problem that an activity is troublesome. However, in the present condition which the personal digital assistant miniaturizes every year, since a big tooth space is not securable for the dc-battery hold section, the tooth space for holding said harness is narrow, where a lid is shut depending on the case, a harness is put between a case and a lid, and there is also a problem that a harness may be damaged. Then, this invention offers the personal digital assistant equipped with the manufacture approach of a dc-battery and a dc-battery that it can improve and dependability, productivity, and safety can be manufactured in a compact, and this dc-battery.

[0004]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention indicated to claim 1 A battery cell (for example, battery cell 4 in an operation gestalt), The connector electrically connected to each terminal of this battery cell (For example, connector 6 in an operation gestalt) And the circuit board (for example, circuit board 5 in an operation gestalt) is arranged, and it is characterized by really fabricating these battery cells, a connector, and the circuit board in the resin mold section (for example, resin mold section 3 in an operation gestalt). Thus, with constituting, the compact dc-battery formed in one in the resin mold section can be obtained.

[0005] Invention indicated to claim 2 The positive-electrode terminal (for example, positive-electrode terminal in an operation gestalt (+)) and negative-electrode terminal of a battery cell A connection

terminal (For example, negative-electrode terminal in an operation gestalt (-)) The circuit board is connected through for example, (the positive-electrode connection member 8 in an operation gestalt and the negative-electrode connection member 7). A connector is formed in this circuit board. Said circuit board The external surface of a battery cell Close arrangement is carried out in the condition of having insulated to (for example, side-face 4a in an operation gestalt), and a dc-battery unit (for example, dc-battery unit 2 in an operation gestalt) is formed, and it is characterized by covering this dc-battery unit with the resin mold section. Thus, with constituting, the compact dc-battery with which a battery cell, a connection terminal, the circuit board, and a connector were formed in one in the resin mold section can be obtained.

[0006] Invention indicated to claim 3 carries out close arrangement of a battery cell, and the connector and circuit board of each other which are electrically connected to each terminal of this battery cell, and forms a dc-battery unit. This dc-battery unit is set in metal mold (for example, metal mold 10 in an operation gestalt). It is characterized by pouring in resin between the mold cavity in metal mold (for example, mold cavity 11 in an operation gestalt), and a dc-battery unit, making it solidify within metal mold, carrying out an after [cooling] mold aperture, and manufacturing a dc-battery. Thus, with constituting, it can unify by covering a dc-battery unit with the resin into which it is poured into metal mold, and a dc-battery can be obtained.

[0007] Invention indicated to claim 4 is characterized by setting a dc-battery unit according to claim 2 in metal mold, pouring in resin between the mold cavity in metal mold, and a dc-battery unit, making it solidify within metal mold, carrying out an after [cooling] mold aperture, and manufacturing a dc-battery.

[0008] Invention indicated to claim 5 is a personal digital assistant (for example, the portable telephone K in an operation gestalt, a portable telephone K1) characterized by having a dc-battery (for example, the dc-battery 1 in an operation gestalt, a dc-battery 101) according to claim 1 or 2. Thus, it becomes possible to lessen with constituting the occupancy tooth space of the part which contains a dc-battery.

[0009] The personal digital assistant with which invention indicated to claim 6 was equipped with the dc-battery according to claim 1 or 2 The hold section which is (for example, the portable telephone K in an operation gestalt), and equips with a dc-battery A lid (for example, lid 24 in an operation gestalt) is attached in (for example, the hold section 23 in an operation gestalt) removable. In said hold section The body side connector with which the connector of a dc-battery is inserted by making a dc-battery slide ahead (For example, the body side connector 25 in an operation gestalt) is formed in the location which counters in the slide direction of a dc-battery. It is characterized by forming in the background of said lid the fixed rib (for example, fixed rib 26 in an operation gestalt) inserted between said hold sections and back end sections of a dc-battery. Thus, with constituting, a lid is opened, the hold section is equipped with a dc-battery, a dc-battery is made to slide ahead, the connector of a dc-battery is inserted in a body side connector, where the fixed rib of a lid is inserted between the hold section and the back end section of a dc-battery, the hold section is blockaded with a lid and a dc-battery can be attached.

[0010] Invention indicated to claim 7 A dc-battery according to claim 1 or 2 The personal digital assistant equipped with (for example, the dc-battery 101 in an operation gestalt) The hold section which is (K1 [for example,] in an operation gestalt), and equips with a dc-battery A lid (for example, lid 241 in an operation gestalt) is attached in (for example, the hold section 231 in an operation gestalt) removable. At the pars basilaris ossis occipitalis of said hold section It is characterized by forming this one end connector (for example, body side connector 251 in an operation gestalt) with which the connector (for example, connector 61 in an operation gestalt) of a dc-battery is inserted by pushing in a dc-battery. Thus, with constituting, if a lid is opened and a dc-battery is stuffed into the pars-basilaris-ossis-occipitalis side of the hold section, the connector of a dc-battery is inserted in a body side connector, the hold section is blockaded with a lid in the condition, and a dc-battery can be attached.

[0011]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with a drawing. Drawing 1 shows the dc-battery of the operation gestalt of this invention. A dc-battery 1 is used as the object for the portable telephones as a personal digital assistant, and an object for PHS, and

consists of a dc-battery unit 2 and the resin mold section 3.

[0012] Said dc-battery unit 2 is equipped with a battery cell 4, the circuit board 5, the connector (electrical connection) 6, the negative-electrode connection member (connection terminal) 7, the positive-electrode connection member (connection terminal) 8, and the insulation sheet 9 as shown in drawing 2 and drawing 3. Had the thin rectangle container made from aluminum by which deep-drawing shaping was carried out, for example, a battery cell 4 is a lithium ion dc-battery. As shown in drawing 3, a negative-electrode terminal (-) is prepared and parts other than this negative-electrode terminal (-) are constituted as a positive-electrode terminal (+) by the front end section of a battery cell 4.

[0013] The circuit board 5 is the member of the shape of a rectangle corresponding to side-face (external surface) 4a which meets in the die-length direction of said battery cell 4. This circuit board 5 is a substrate which contains the ** safety circuit at the circuit for charge control, and the time of short, and lands 5c and 5d are formed in the front end [of rear-face 5b], and back end side. Close arrangement of this circuit board 5 is carried out through an insulation sheet 9 at side-face 4a of a battery cell 4.

[0014] Connection immobilization of the connector 6 is carried out at surface 5a by the side of the front end of the circuit board 5. This connector 6 is a member which is inserted in the connector of the portable telephone mentioned later, and connects a battery cell 4 and a portable telephone electrically. It points to plug section 6a of a connector 6 in the front end side of a battery cell 4. Between the negative-electrode terminal (-) of said battery cell 4, and land 5c by the side of the front end of the circuit board 5, each terminals 7a and 7b of the crooked negative-electrode connection member 7 which flows through these are connected by spot welding. Moreover, each terminals 8a and 8b of the positive-electrode connection member 8 with which the configuration same also between the positive-electrode terminal (+) of said battery cell 4 and 5d of lands by the side of the back end of the circuit board 5 was crooked are connected by spot welding.

[0015] Here, the negative-electrode connection member 7 is arranged along side-face 4a of a battery cell 4, and a front end side, and the positive-electrode connection member 8 is arranged along side-face 4a of a battery cell 4, and a back end side. For example, an insulation sheet 9 covers side-face 4a of a battery cell 4, and a part of front end side, it is members, such as a double-sided tape, and it performs eye tacking of the negative-electrode connection member 7 and the positive-electrode connection member 8 while it performs the insulation with said negative-electrode connection member 7, the circuit board 5, and a battery cell 4. It extended to the part to which front end marginal 9a of an insulation sheet 9 results the front end side of a battery cell 4 before a negative-electrode terminal (-), and back end marginal 9b of an insulation sheet 9 is equipped with wrap die length for side-face 4a of a battery cell 4.

[0016] And as are shown in drawing 1 and the dc-battery unit 2 constituted in this way covers a perimeter to horseshoe-shaped, it is really fabricated by the resin mold section 3, and a dc-battery 1 is constituted. Thereby, a battery cell 4, the circuit board 5, a connector 6, the negative-electrode connection member 7, the positive-electrode connection member 8, and an insulation sheet 9 are fixed by the resin mold section 3 in one.

[0017] According to the dc-battery 1 of the above-mentioned operation gestalt, the circuit board 5 is connected to the positive-electrode terminal (+) and negative-electrode terminal (-) of a battery cell 4 through the positive-electrode connection member 8 and the negative-electrode connection member 7. By forming a connector 6 in this circuit board 5, carrying out close arrangement of said circuit board 5 through an insulation sheet 9 at side-face 4a of a battery cell 4, forming the dc-battery unit 2, and covering this dc-battery unit 2 in the resin mold section 3 The compact dc-battery 1 formed in one in the resin mold section 3 can be obtained.

[0018] Therefore, since resin mold section 3 the very thing demonstrates the insulating effectiveness, components mark can be reduced as compared with the case where two or more insulating materials are used, and a cost cut can be aimed at. Moreover, by the resin mold section 3, since circuit board 5 grade will be closed by resin, while high safety is realizable, in order that the resin mold section 3 may serve as junction of covering and each part article, components mark can be reduced, and a miniaturization becomes possible, and dependability improves. The resin mold section 3 can be made to carry out the

load assignment of the load which is applied to a connector 6 in the resin mold section 3 in the circuit board 5 for a wrap reason. Therefore, the structure of a connector 6 can be simplified and a cost cut can be aimed at. Moreover, since a battery cell 4, the circuit board 5, and a connector 6 are really fabricated in the resin mold section 3, a high mechanical strength is obtained, impact nature etc. increases, and dependability can be improved.

[0019] Next, the manufacture approach of forming said resin mold section 3 in the perimeter of the dc-battery unit 2 with the metal mold 10 made from aluminum as shown in drawing 4 is explained. First, the dc-battery unit 2 mentioned above is set to attachment slot 11a formed in female mold 10a. At this time, 11h of paries medialis orbitae of attachment slot 11a is contacted in plug section 6a of the connector 6 of said dc-battery unit 2, and surface 6b of a connector 6, and the dc-battery unit 2 is set. Thereby, the space section is formed in the perimeter of the dc-battery unit 2 only for a part for the connector 6 to have projected. In addition, the side face (other side-face 4b which counters side-face 4a of a battery cell 4) of the dc-battery unit 2 is in contact with the side in which the connector 6 is attached with this operation gestalt in the opposite side at 11h of paries medialis orbitae of attachment slot 11a.

[0020] The gage pin 12 of female mold 10a is inserted in the tooling holes 13 of punch 10b, and it carries out [mold clamp] of punch 10b and the female mold 10a in order to make attachment slot 11 of said female mold 10a a adjust attachment slot 11 of punch 10b b in this condition. Next, polyamide resin is poured in with low temperature and low voltage from the resin impregnation slot 14 (14a, 14b) formed in a part for the joint of punch 10b and female mold 10a.

[0021] The poured-in polyamide resin spreads in the mold cavity 11 formed between attachment slot 11a in metal mold 10, and 11b. With this operation gestalt, as the perimeter of the dc-battery unit 2 arranged between attachment slot 11a and 11b, the near side face in which the connector 6 is specifically attached and the front end side of a battery cell 4, and a back end side are surrounded to horseshoe-shaped, polyamide resin is poured in. And a mold aperture will be carried out, metal mold 10 will be extruded, if it leaves and cools compulsorily and polyamide resin solidifies within metal mold 10, a product is extruded by the pin of a hole 15, and manufacture of a dc-battery 1 is ended.

[0022] Since according to the manufacture approach of the dc-battery of the above-mentioned operation gestalt set the dc-battery unit 2 in metal mold 10, pour in resin between the mold cavity 11 in metal mold 10, and the dc-battery unit 2, it is made to solidify within metal mold 10, an after [cooling] mold aperture is carried out and a dc-battery 1 is manufactured, the dc-battery 1 which it was covered with the polyamide resin into which the dc-battery unit 2 is poured into metal mold 10, and was unified can be obtained. Therefore, the man day for attaching each part article can be omitted, and productivity can be improved. Moreover, since polyamide resin is poured in with low temperature and low voltage, it does not have a bad influence on the circuit board 5.

[0023] Next, the portable telephone K as a personal digital assistant which equips with said dc-battery 1 based on drawing 5 and drawing 6 is explained. Since a display 20 and the key stroke section 21 are the things of the common knowledge structure constituted possible [folding] by the hinge 22, the whole configuration explains the portable telephone K shown below only with the perspective view seen from the background in the condition of having folded up so that it might not be shown but he could understand the wearing condition of a dc-battery 1.

[0024] The concave hold section 23 which equips the background of a control unit 21 with a dc-battery 1 is formed in the portable telephone K. A lid 24 is attached in this hold section 23 removable. Stop section 24b is formed in a tip side, Heights 24a and 24a stop stop section 24b on the discharge hook H by the side of a portable telephone K, where Heights 24a and 24a are stopped in the hold section 23, and specifically, they attach in the end face side of a lid 24 at the hold section 23.

[0025] The body side connectors 25 which are paries-medialis-orbitae 23a which counters said hold section 23 in the slide direction of a dc-battery 1, and are inserted in this connector 6 in the location which counters a connector 6 are ***** with picking. That is, after setting a dc-battery 1 to the hold section 23, it has the structure where the connector 6 of a dc-battery 1 is connected to the body side connector 25 by making a dc-battery 1 slide to the negative-electrode terminal (-) side of the dc-battery 1 which is the front. Therefore, when said hold section 23 equips with a dc-battery 1 and a connector 6 is

inserted in the body side connector 25, the space section for plug cost of a dc-battery 1 will be formed between the back end sections of a dc-battery 1. In addition, it is the resin mold section 3 which hatching shows to drawing 5 (setting to the following drawings the same).

[0026] And as shown in drawing 6, pair formation of the fixed rib 26 is carried out on the background by the side of the end face of said lid 24. These fixed ribs 26 and 26 are inserted in the space section formed between the hold section 23 and the back end section of a dc-battery 1 at the time of junction of the connector 6 of a dc-battery 1, i.e., the space section used as the plug cost of a connector 6. And each fixed rib 26 is equipped with inclined plane 26a, and when a lid 24 is attached in the hold section 23, it generates the force which supports the back end section of a dc-battery 1 (going ahead). thus, in the constituted portable telephone K, dc-battery 1 the very thing is miniaturized, and a harness is also unnecessary -- since the tooth space of the hold section 23 which contains a dc-battery 1 can make only a part small -- a portable telephone K -- as a whole -- this -- small -- it can lightweight-ize.

[0027] Next, according to drawing 5 - drawing 11, the procedure of equipping a portable telephone K with a dc-battery 1 is explained. As shown in drawing 5, the lid 24 of a portable telephone K is opened and removed, and the hold section 23 is equipped with a dc-battery 1 (drawing 7). Next, as an arrow head shows, a dc-battery 1 is made to slide ahead to drawing 7, and the connector 6 of a dc-battery 1 is inserted in the body side connector 25 at it (drawing 8).

[0028] As shown in drawing 9 and drawing 10, height 24a of a lid 24 in next, the condition of having stopped in the hold section 23 If a lid 24 is rotated in the direction of closing, a fixed rib 26 will be inserted between the back end section of a dc-battery 1, and the hold section 23. If stop section 24b stops on the discharge hook H by the side of a portable telephone K (drawing 11), it will be blockaded with a lid 24 and the hold section 23 will end the attachment to the portable telephone K of a dc-battery 1. Therefore, when equipping with a dc-battery 1, since the actuation which folds up and contains a harness like before becomes unnecessary, wearing becomes easy. Moreover, migration in the direction from which a dc-battery 1 separates with the fixed rib 26 of a lid 24 can be regulated, and a dc-battery 1 can be attached certainly without a backlash.

[0029] Next, it is the dc-battery 101 of other operation gestalten which is shown in drawing 12. That plug section 61a points to the connector 61 of this dc-battery 101 in the inferior-surface-of-tongue side of a dc-battery 101. Since the other part is the same as that of said dc-battery 1, the same sign is given to the same part and explanation is omitted. Moreover, since it is the same as that of said dc-battery 1 only by the attachment sense of a connector 61 being changed also about the manufacture approach of this dc-battery 101 except it, explanation is omitted.

[0030] Therefore, according to this dc-battery 101, the compact dc-battery which can improve dependability and safety as well as said dc-battery 1 can be obtained. Moreover, corresponding to this dc-battery 101, as shown in drawing 13, modification is added also to the attaching position of the body side connector 251 by the side of a portable telephone K1. That is, the body side connector 251 is the pars basilaris ossis occipitalis of the hold section 231, and is formed in the location which counters the connector 61 of said dc-battery 101. Moreover, the lid 241 equipped the back end edge with stop height 241a stopped to the paries lateralis orbitae of the hold section 231, and equips the front end edge with stop section 241b stopped like the above-mentioned on the discharge hook H by the side of a portable telephone K1. In addition, also about this portable telephone K1, since the fundamental configuration is the same as that of said portable telephone K, the same sign is given to the same part and explanation is omitted.

[0031] Therefore, in equipping a portable telephone K1 with a dc-battery 101, as shown in drawing 13, the lid 241 of a portable telephone K1 is opened and removed, and the hold section 231 is equipped as it pushes into a dc-battery 101 from a top. Thereby, the connector 61 of a dc-battery 101 is inserted in the body side connector 251 (drawing 14). Next, as the hold section 231 is covered from a top with a lid 241 as shown in drawing 15, and shown in drawing 16, where stop height 241a of a lid 241 is stopped in the hold section 231, if a lid 241 is made to slide in the direction of an arrow head of drawing 16 and stop section 241b stops on the discharge hook H by the side of a portable telephone K, it will be blockaded with a lid 241 and the hold section 231 will end the attachment to the portable telephone K1

of a dc-battery 101.

[0032] Therefore, in this portable telephone 1, if a lid 241 is opened and a dc-battery 101 is stuffed into the pars-basilaris-ossis-occipitalis side of the hold section 231, since the connector 61 of a dc-battery 101 is inserted in the body side connector 251, the hold section 231 is blockaded with a lid 241 in that condition and a dc-battery can be attached, migration in the direction from which a dc-battery 101 separates by lid 241 self can be regulated, and a dc-battery 101 can be attached certainly without a backlash. In addition, this invention is not restricted to the above-mentioned operation gestalt, and you may make it the resin mold section which surrounds the perimeter of a dc-battery, for example, is prepared cover the perimeter whole region of a dc-battery.

[0033]

[Effect of the Invention] As explained above, according to invention indicated to claim 1, it is effective in the ability to reduce components mark as compared with the case where two or more insulating materials are used, and aim at a cost cut in order for the resin mold section itself to demonstrate the insulating effectiveness. Moreover, it is effective in being able to reduce components mark, and a miniaturization becoming possible, in order that the resin mold section may serve as junction of covering and each part article, and dependability improving by the resin mold section, while high safety is realizable, since the circuit board etc. will be closed by resin. And the resin mold section can be made to carry out the load assignment of the load which is applied to a connector in the resin mold section in the circuit board for a wrap reason, therefore the structure of a connector can be simplified, and it is effective in the ability to aim at a cost cut. Since a battery cell, the circuit board, and a connector are really fabricated in the resin mold section, there is effectiveness which obtains a high mechanical strength and can improve dependability.

[0034] According to invention indicated to claim 2, it is effective in the ability to obtain the compact dc-battery which can improve dependability and safety like claim 1.

[0035] Since according to invention indicated to claim 3 or claim 4 it can unify by covering the dc-battery unit set in metal mold with the resin into which it is poured into metal mold and a dc-battery can be obtained, there is effectiveness which can omit the man day for attaching each part article, and can improve productivity.

[0036] Since it becomes possible to lessen the occupancy tooth space of the part which contains a dc-battery according to invention indicated to claim 5, it is effective in lightweight-izing and a miniaturization being realizable.

[0037] According to invention indicated to claim 6, it is effective in the ability to regulate migration in the direction from which a dc-battery separates with the fixed rib of a lid in addition to the effectiveness of above-mentioned claim 5, and attach a dc-battery certainly without a backlash.

[0038] According to invention indicated to claim 7, it is effective in the ability to regulate migration in the direction from which a dc-battery separates with the lid itself in addition to the effectiveness of above-mentioned claim 5, and attach a dc-battery certainly without a backlash.

[Translation done.]